

What is claimed is:

1. A disk-shaped optical information medium comprising:  
a first substrate having a center hole;  
5 a second substrate having a center hole; and  
a radiation curable resin interposed between the  
first and second substrates for bonding together the  
first and second substrates,

wherein the optical information medium further  
10 comprises a stopper for preventing the radiation curable  
resin from protruding into the center holes of the sub-  
strates, and

a space between the first and second substrates  
of at least a half of a clamp region for clamping the  
15 optical information medium is filled with the resin.

2. An optical information medium according to claim 1,  
wherein the stopper comprises at least one concave  
portion formed on at least one of the first and second  
20 substrates.

3. An optical information medium according to claim 2,  
wherein the concave portion is a ring-shaped groove which  
is substantially concentric with the center holes of the  
25 substrates.

4. An optical information medium according to claim 1,  
wherein the stopper comprises at least one concave  
portion formed on one of the first and second substrates  
30 and at least one convex portion formed on the other  
substrate.

5. An optical information medium according to claim 4,

wherein the concave portion is disposed to face the convex portion.

5 6. An optical information medium according to claim 1, wherein the stopper is formed at a position closer to the center holes of the substrates with respect to the center of the clamp region, and the radiation curable resin spreads to the position of the stopper.

10 7. An optical information medium according to claim 1, wherein the stopper is formed at a position farther from the center holes of the substrates with respect to the center of the clamp region, and a layer of another resin layer is formed on a portion of the substrates closer to  
15 the center holes with respect to the stopper.

20 8. An optical information medium according to claim 7, wherein the another resin layer comprises a radiation curable resin having a viscosity higher than the radiation curable resin for bonding the first and second substrates.

25 9. An optical information medium according to claim 1, wherein the stopper comprises a sealant layer.

10. An optical information medium according to claim 9, wherein the sealant layer is formed by printing a radiation curable resin.

30 11. An optical information medium according to claim 9, wherein the sealant layer is made of a hot melt adhesive.

12. A disk-shaped optical information medium comprising:

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a first substrate having a center hole;  
a second substrate having a center hole; and  
a radiation curable resin interposed between the  
first and second substrates for bonding together the  
first and second substrates,

wherein the optical information medium further  
comprises a ring-shaped groove substantially concentric  
with the center holes of the substrates, formed on at  
least one of the first and second substrates at a posi-  
tion closer to the center holes with respect to the  
center of a clamp region for clamping the optical  
information medium, and

a space between the first and second substrates  
of at least a half of the clamp region is filled with the  
radiation curable resin.

13. An optical information medium according to claim 12,  
wherein an information signal surface is formed on a  
portion of the at least one substrate closer to an outer  
circumference of the substrate with respect to an outer  
rim of the groove on the substrate, and a reflection film  
is formed on the groove and the information signal  
surface.

14. An optical information medium comprising a first  
substrate having a center hole, a second substrate having  
a center hole, and a radiation curable resin interposed  
between the first and second substrates to integrate the  
first and second substrates, wherein the radiation  
curable resin does not exist in a region adjacent to the  
center holes of the first and second substrates.

15. A disk-shaped optical information medium comprising:

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a first substrate having a center hole;  
a second substrate having a center hole; and  
a radiation curable resin interposed between the  
first and second substrates for bonding together the  
first and second substrates,

wherein an outer circumference of at least one of  
the first and second substrates is tapered.

16. A disk-shaped optical information medium comprising:

a first substrate having a center hole;  
a second substrate having a center hole; and  
a radiation curable resin interposed between the  
first and second substrates for bonding together the  
first and second substrates,

wherein the radiation curable resin has a weath-  
er-resistance pigment mixed therein.

17. A disk-shaped optical information medium comprising:

a first substrate having a center hole;  
a second substrate having a center hole; and  
a radiation curable resin interposed between the  
first and second substrates for bonding together the  
first and second substrates,

wherein the radiation curable resin comprises a  
resin of which color density varies with the level of the  
curing of the resin.

18. A method for fabricating an optical information  
medium, comprising the steps of:

forming a pair of substrates each having a center  
hole;

placing one of the pair of substrates on the  
other substrate with a radiation curable resin interposed

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curing the radiation curable resin by irradiating the resin with radioactive rays capable of passing through at least one of the pair of substrates so as to bond the pair of substrates together,

wherein the step of forming a pair of substrates includes the step of forming a stopper for preventing the radiation curable resin from protruding into the center holes on at least one of the pair of substrates, and

the step of placing one of the pair of substrates on the other substrate includes the step of filling at least a half of a clamp region of the optical information medium with the radiation curable resin.

19. A method according to claim 18, wherein the step of placing one of the pair of substrates on the other substrate includes the steps of:

applying the radiation curable resin to a portion of the substrate on which the stopper is formed closer to an outer circumference of the substrate with respect to the stopper to form a donut-shaped resin layer while the substrate being rotated, placing the other substrate on the substrate with the stopper, and rotating the both substrates integrally; and

curing the radiation curable resin by irradiating the radiation curable resin with radioactive rays passing through at least one of the substrates.

20. A method according to claim 18, wherein the step of placing one of the pair of substrates on the other substrate includes the step of:

mounting the pair of substrates on a rotational table having an outer diameter smaller than an outer

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diameter of at least one of the pair of substrates so as to rotate the pair of substrates.

5 21. A method according to claim 18, wherein the step of placing one of the pair of substrates on the other substrate includes the step of:

10 mounting the pair of substrates on a rotational table having an outer diameter smaller than an outer diameter of at least one of the pair of substrates so as to rotate the pair of substrates, and absorbing the radiation curable resin through the center holes of the pair of substrates while the pair of substrates being rotated.

15 22. A method according to claim 18, wherein, in the step of curing the radiation curable resin, a transparent plate having an outer diameter smaller than an outer diameter of at least one of the pair of substrates is placed on the bonded pair of substrates and the radiation curable resin is irradiated with the radioactive rays passing through the transparent plate.

20 23. A method for fabricating an optical information medium, comprising the steps of:

25 forming a pair of substrates each having a center hole;

placing one of the pair of substrates on the other substrate with a radiation curable resin interposed therebetween; and

30 curing the radiation curable resin with radioactive rays capable of passing through at least one of the pair of substrates so as to bond together the pair of substrates,

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wherein the step of placing one of the pair of substrates on the other substrate includes the step of disposing the radiation curable resin so that the resin is away from the center holes of the substrates.

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24. A method according to claim 23, wherein the step of forming a pair of substrates includes the step of forming a stopper for preventing the radiation curable resin from protruding into the center holes on at least one of the pair of substrates.

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25. A method according to claim 24, wherein the step of placing one of the pair of substrates on the other substrate includes the steps of:

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applying the radiation curable resin to a portion of the substrate on which the stopper is formed closer to an outer circumference of the substrate with respect to the stopper to form a donut-shaped resin layer while the substrate are being rotated, forming a layer of another radiation curable resin on a portion of the substrate closer to an inner circumference with respect to the stopper, placing the other substrate on the substrate with the stopper, and rotating both substrates integrally; and

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curing the radiation curable resin by irradiating the radiation curable resin with radioactive rays passing through at least one of the pair of substrates.

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26. A method according to claim 23, wherein, in the step of curing the radiation curable resin, a transparent plate is placed on the bonded pair of substrates and the radiation curable resin is irradiated with the radioactive rays passing through the transparent plate.

27. A method according to claim 25, wherein the another radiation curable resin is applied by use of a roller.

28. A method for fabricating an optical information medium, comprising the steps of:

forming a pair of substrates each having a center hole;

placing one of the pair of substrates on the other substrate with a radiation curable resin interposed therebetween; and

curing the radiation curable resin with radioactive rays capable of passing through at least one of the pair of substrates so as to bond together the pair of substrates,

wherein, in the step of forming a pair of substrates, an outer circumference of at least one of the pair of substrates is tapered.

29. A method according to claim 28, wherein the step of placing one of the pair of substrates on the other substrate includes the step of:

shaping the radiation curable resin at outer circumferences of the pair of substrates by use of a transfer roller having a shape corresponding to a shape of a recess formed by the tapered outer circumferences of the pair of substrates.

30. A method according to claim 28, wherein the step of placing one of the pair of substrates on the other substrate includes the step of:

mounting the pair of substrates on a rotational table having an outer diameter smaller than an outer diameter of at least one of the pair of substrates so as

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to rotate the pair of substrates.

31. A method according to claim 28, wherein the step of placing one of the pair of substrates on the other substrate includes the step of:

mounting the pair of substrates on a rotational table having an outer diameter smaller than an outer diameter of at least one of the pair of substrates so as to rotate the pair of substrates, and absorbing the radiation curable resin through the center holes of the pair of substrates while the pair of substrates are being rotated.

32. A method according to claim 28, wherein the step of curing the radiation curable resin includes the step of placing a transparent plate having another diameter smaller than an outer diameter of at least one of the pair of substrates on the bonded pair of substrates and irradiating the radiation curable resin with the radioactive rays passing through the transparent plate.

33. A method for fabricating an optical information medium comprising the step of bonding a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween,

wherein a sealant layer is formed of another radiation curable resin on a portion of one of the substrates closer to an inner circumference of the substrate, the viscosity of the another radiation curable resin when it is not cured being higher than that of the radiation curable resin for bonding formed on a portion of the substrate closer to an outer circumference of the

substrate, and the radiation curable resins are cured by radioactive rays passing through the first or second substrate to bond together the first and second substrates.

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34. A method for fabricating an optical information medium comprising the step of bonding a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween,

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wherein a sealant layer is formed by printing a radiation curable resin on a portion of one of the substrates closer to an inner circumference of the substrate, and the radiation curable resins are cured by radioactive rays passing through the first or second substrate to bond together the first and second substrates.

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35. A method for fabricating an optical information medium comprising the step of bonding a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween,

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wherein a sealant layer is formed of a hot melt adhesive on a portion of one of the substrates closer to an inner circumference of the substrate, the first and second substrates are pressed with the radiation curable resin and the sealant layer being interposed therebetween, and the radiation curable resin is cured by radioactive rays passing through the first or second substrate to bond together the first and second substrates.

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36. A method for fabricating an optical information medium comprising the step of bonding together a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween,

wherein a portion of the radiation curable resin protruding into the center holes is removed before the radiation curable resin is cured.

37. A method according to claim 36, wherein the portion of the radiation curable resin protruding into the center holes is removed by use of a jig.

38. A method according to claim 36, wherein the portion of the radiation curable resin protruding into the center holes is removed by absorbing through a suction port disposed on a boss of a spindle for rotating the substrates.

39. A method according to claim 36, wherein the portion of the radiation curable resin protruding into the center holes is removed by absorbing by a sponge disposed on a boss of a spindle for rotating the substrates.

40. A method for fabricating an optical information medium, comprising the steps of:

placing one of a pair of substrates, each having a center hole, on the other substrate with a radiation curable resin interposed therebetween; and

curing the radiation curable resin with radioactive rays capable of passing through at least one of the pair of substrates so as to bond together the pair of substrates,

wherein a resin of which color density varies with the degree of the curing of the resin is used as the radiation curable resin, the color density of the resin is measured when the resin is irradiated with radioactive rays, and the curing of the resin is terminated when the resin obtains a predetermined color density.

41. A method for fabricating an optical information medium comprising the step of bonding a first substrate and a second substrate with radiation curable resin interposed therebetween,

wherein radioactive rays passing through the first substrate and radioactive rays passing through the second substrate radiate the radiation curable resin so as to cure the radiation curable resin.

42. A method according to claim 41, wherein at least one of radiation intensity and duration of the radioactive rays is adjusted according to a radioactive ray transmittance of the substrate through which the radioactive rays pass.

✓ 43. An apparatus for fabricating an optical information medium, comprising:

means for applying a radiation curable resin, while a first substrate having a stopper for preventing the radiation curable resin from protruding into a center hole being rotated, to a portion of the first substrate closer to an outer circumference of the first substrate with respect to the stopper, to form a donut-shaped resin layer;

means for placing a second substrate on the first substrate;

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means for rotating the first and second substrates integrally; and

means for irradiating the radiation curable resin with radioactive rays passing through at least one of the first and second substrates.

2/ 44. An apparatus according to claim 43, further comprising means for placing a transparent plate on the bonded substrates.

10 3/ 45. An apparatus according to claim 43, further comprising means for applying another radiation curable resin to a portion of the substrate closer to an inner circumference of the substrate with respect to the stopper.

15 4/ 46. An apparatus according to claim 45, wherein the means for applying another radiation curable resin includes any of brush means, roller means, and clean printing means.

20 4/ 47. An apparatus for fabricating an optical information medium by bonding a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween, comprising:

25 means for applying a first radiation curable resin on a portion of the first substrate closer to an inner circumference of the first substrate and applying a second radiation curable resin having a viscosity lower than the first radiation curable resin to a portion of  
30 the first substrate closer to an outer circumference of the first substrate while the first substrate is being rotated;

means for placing the second substrate on the

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first substrate;

means for rotating the first and second substrates integrally; and

5 means for irradiating the radiation curable resins with radioactive rays passing through at least one of the first and second substrates.

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48. An apparatus for fabricating an optical information medium by bonding a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween, comprising:

10 means for applying a portion of the radiation curable resin on a portion of the first or second substrate closer to an inner circumference of the first or second substrate;

15 means for applying the remainder of the radiation curable resin on a portion of the first substrate closer to an outer circumference of the first substrate while the first substrate is being rotated;

20 means for placing the second substrate on the first substrate;

means for rotating the first and second substrates integrally; and

25 means for irradiating the radiation curable resin with radioactive rays passing through at least one of the first and second substrates.

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30 49. An apparatus for fabricating an optical information medium by bonding together a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween, comprising:

means for applying a hot melt adhesive to a portion of the first or second substrate closer to an inner circumference of the first or second substrate;

5 means for applying the radiation curable resin to a portion of the first substrate closer to an outer circumference of the first substrate while the first substrate is being rotated;

means for placing the second substrate on the first substrate;

10 means for rotating the first and second substrates integrally; and

means for irradiating the radiation curable resin with radioactive rays passing through at least one of the first and second substrates.

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✓50. An apparatus for fabricating an optical information medium by bonding together a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween, comprising:

a table for integrally rotating the first and second substrates with the radiation curable resin before being cured interposed therebetween; and

25 means for absorbing the radiation curable resin interposed between the first and second substrates through the center holes of the first and second substrates.

30 ✓51. An apparatus for fabricating an optical information medium by bonding together a first substrate having a center hole and a second substrate having a center hole with a radiation curable resin interposed therebetween, comprising:

means for irradiating the radiation curable resin with radioactive rays passing through at least one of the first and second substrates; and

5 means for measuring a color density of the radiation curable resin.

10 52. A method according to claim 18, wherein, in the step of curing the radiation curable resin, the radioactive rays are reflected near the outer circumferences of the substrates placed on each other to irradiate the outer circumferences of the substrates.

15 53. A method according to claim 28, wherein, in the step of curing the radiation curable resin, the radioactive rays are reflected near the outer circumferences of the substrates placed on each other to radiate the outer circumferences of the substrates.

20 54. A method according to claim 52, wherein the radioactive rays are reflected by a mirror of a truncated cone shape disposed to surround the outer circumferences of the substrates.

25 55. A method according to claim 52, wherein the radioactive rays are reflected by a mirror of a truncated cone shape disposed to surround the outer circumferences of the substrates.

30 56. An apparatus according to claim 43, further comprising means for irradiating the outer circumferences of the substrate placed on each other with the radioactive rays.

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